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Mathew Hillier

University of South Australia

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Multiple Perspectives on the Musings of Systems Analysts

Mathew Hillier

School of Accounting and Information Systems, University of South Australia
G.P.O Box 2471, Adelaide, South Australia, Australia, 5001
mathew.hillier@unisa.edu.au

Abstract

This paper presents the findings of research in progress on the analysis of project journals undertaken by systems analysts. The investigation is part of a wider research program into the development of a Multiple Perspective framework called T.O.P² (Hillier 2002).

The intention of the T.O.P² framework (pronounced 'top squared') is to allow an analyst to consider a broader range of factors relevant to the systems development effort including the technical, organisational, personal and social, while the journal acts as a recording mechanism for those thoughts.

This research seeks to do two things. Firstly, to show that journals can act as a useful recording mechanism for the perspectives gained via the use of the T.O.P² framework and second, that the T.O.P² framework permits retrospective analysis of the journal content, to 'uncover' the perspectives present in the musings of the systems analyst. This retrospective analysis can be performed by the analysts themselves at a later time to enhance their own learning or by others with the aim of assisting them to understand the perspectives and assumptions on which the systems development was based.

The author draws evidence from the pedagogical, soft systems, multiple perspectives and systems development literature to explain the basis of the process. The process outlined in this paper takes particular inspiration from Checkland's Soft Systems Methodology (SSM) (Checkland 1981, Checkland & Scholes 1999) and Mitroff and Linstone's (1993) T.O.P. The paper outlines the course of this research within the broader context of the research program on T.O.P² and presents some preliminary findings from one stage of the research program.

Keywords: multiple perspectives, human activity systems, systems analysis, journal, diary, blog, reflection.

1. Discussion

In considering systems developments, each member of the project team approaches the problem situation with their own unique perspective (Haynes 2000, Hillier 2002). Mitroff and Linstone (1993) propose that "the most limiting constraints in building a model or representation of a problem are usually imposed not by the problem itself but by the mindset of the problem solver". This personal (un-assisted) perspective limits the range of possible problem statements and therefore the number of possible solutions that the person can envisage. As Mitroff and Linstone (1993) state - "Frequently what is omitted from the problem statement or model is more important than what is included". Systems developments are complex environments because technical, social, organisational and personal issues combine to form a 'messy problem' situation (Checkland 1981). Markus (1983) highlights that non-technical elements, such as politics play a role in decision-making and the direction that projects take. Therefore a limited view (i.e only a technical view) would lead to systems failure, as much that may be significant in the success of the system may be overlooked (Martiz & Harrison 2000). Indeed a great many systems developments fail (Ulfelder 2001, Jiang, Klein & Discenza 2001) due to unforeseen factors (Checkland 2000). To overcome this, we should endeavour find out as much about the problem situation as possible. As

applied in Soft Systems (Checkland 1981), different models of the problem can be developed based in a range of perspectives. The more perspectives that can be brought together, the more informed the problem solvers would be about the nature of the problem.

This can be approached by individuals and groups. As people perceive things in different ways (Matsumoto 1994), even to the extent that such things as visual perception is impacted by psychological matters (LeRoux 1994), they contribute to the greater understanding of the problem situation. In this sense, the more eyes that look, the more we see, and so the ‘richer’ the picture becomes. Therefore, combining the analysis of the team members produces greater depth of analysis. In deed this is why multidisciplinary teamwork is favoured over that of mono-disciplinary or individual thought (Martiz & Harrison 2000), particularly in systems developments such as websites (Roesnfield & Morville 1998).

1.1. Multiple Perspectives

As an individual, we may uncover multiple perspectives on the problem by viewing the situation through different ‘lenses’. To assist with this process the T.O.P² framework developed by Hillier (2002) will be utilised. The aim of the T.O.P² framework is to allow the user to identify things that they may have otherwise forgotten by prompting them as they think of each object in the problem domain from a ‘different angle’. For example, the way an engineer may look at the problem versus the way a manger or marketer or human resources person my look at that same problem will raise different sets of considerations and issues. The T.O.P² framework traces its origins to the soft systems and multiple perspectives literature, in particular work by Checkland (1981), Linstone and Mitroff (1993). The T.O.P² framework provides a way for the user to identify various types of objects in the problem domain (objects/things, organizations and people), and provides three ‘lenses’ for looking at each object (technical / scientific, sociological and psychological / personal). It arranges them to allow the user to separate the objects (the thing being looked at) from lenses (the way in which it is being looked at it). It is proposed that by separating objects and lenses that this will allow for a more usable thinking tool (Hillier 2002). Please see Figure 1.

		Lenses (ways of looking)		
		Technical/scientific	Organisational/ Sociological	Personal/ psychological
Object Types	Things			
	Organisations			
	People			

Figure 1 The T.O.P² framework adapted from Hillier (2002).

The components of the T.O.P² framework are outlined below (Hillier 2002), starting with the Types of objects that can be identified in the problem domain.

- Technical objects are ‘physical’, ‘technical’ or ‘logical’ in nature (Hillier 2002). Examples relevant to a web based systems development may include: computer code, ADSL network connection, modem, server, CGI, database and a business process.

- Organisational objects include organisations, groups, clusters, collectives of people (Hillier 2002). Examples include: company, project team, government agency, software supplier, senior management group, steering committee and client organisations.
- People objects refer to individual people in the system or problem domain (Hillier 2002). Examples are: customer contact, employee, chief executive officer, manager, computer user, a programmer, and a graphic artist.

Each of the objects can then be examined using each of three 'lenses'.

- The Technical lens looks from a scientific stance (Hillier 2002), involving the measurement of attributes, counting and reduction. This includes physics, chemistry, mathematics and biology (biology in this case means the parts biologists can explain, but excludes teleology or purposiveness (Checkland 1981).
- The Organisational lens is looking at the object or situation from a sociological angle (Hillier 2002) to examine relationships, interactions, co-operation, affiliations and linkages. In consideration of human societies and of the relationships between groups in these societies (Wilkes & Krebs 1991). Consideration is given to the interactions and relationships between groups of people, between people and things, as well as between individual people. In considering technical objects we look for dependencies, linkages, interaction and the nature of relationships between the various parts of the system. This can be a computer system, business system or social system.
- The Personal lens means to consider the situation or object from a psychological or cognitive frame (Hillier 2002). For example, beliefs, feelings, desires and needs. This also considers the motivations that give rise to 'politics', culturally influenced beliefs, cognitive processes such as learning, understanding and representing knowledge, as well as the as well as a person's 'internal lens' (Hillier 2002) on the world. In regard to technical objects and organisations, this can be their intended function, reason for existing, mission or vision.

1.1.1. Using TOP2 for web systems design

In the course of carrying out the analysis and design effort a project team or individual analyst can utilise T.O.P² to assist in their thinking of various aspects of the project, such as, the website interface. The interface design of a website is a difficult problem because of the need to serve a global audience where a 'mismatch' of assumptions is more likely due to increased differences (this is discussed in detail in Hillier 2003); and because users are particularly hard to contact (Lane & Koronios 2001). For example; if the analyst considers a particular website customer (i.e. in a test scenario as in Roesnfield & Morville 1998), through a technical lens he/she can consider such aspects as computer skills, typical client hardware and software configurations, spending power and the number of repeat visits to the site. Looking through a sociological lens the analyst may consider what market segment this individual belongs to, nationality and professional affiliations, and how they communicate with the company; while looking through a psychological lens the analyst might be lead to consider the motivation of the customer for visiting the website, likes and dislikes regarding the layout and design, and overall satisfaction with the website (Davis 1989). Similar thinking exercises would also be applied to organisational and technical objects. The result of this process should be evident in a richer set of project specifications or site designs that more closely match the needs of the organisation and the site users.

1.1.2. Recording thought and reflective learning

Project journals, diaries or blogs are relatively new to systems development type activities. However, some examples exist. George (2002) used journals in the process for teaching computer programming, while Fairholme, Dougiamas and Dreher (2001) used a journal system in a course on electronic documentation, and recently Lynch and Metcalfe (2003) used project journals in IS industry projects undertaken by masters students to record their concerns about project definition and scope.

Central to learning via journal contribution is reflection, the process of exploring events or issues and accompanying thoughts and feelings (Kerka 2002). The kinds of questions that can be addressed in a journal include (Stewart 2001); What happened? What were your thoughts, feelings, assumptions, beliefs, values, attitudes? What were the reasoning and thinking behind actions and practices? What was good or bad? What are the implications? What changes might be made? What are plans for future actions? Moon (1999) outlines a number of benefits that can be realised via the use of reflective writing. In relation to the use of journals in systems analysis the main benefits are:

- The journal serves as a record of events or issues, observations, comments on personal behaviour, the behaviour of others, politics, feelings and context.
- It provides a reference point for linking to related material, further observations, relevant knowledge or experience, suggestions from others, theory, new information.
- Allows for the ability to explore and record thinking, relating, experimenting, reinterpreting from other points of view, theorizing about problems, testing new ideas.
- Statements about things learnt or solved, the identification of new issues, questions, or actions to follow up.
- Further reflection leading to resolution or looping

By recording their thoughts in a project journal, analysts can maintain a record of their thought process throughout the project. These Journal entries can become a source of further learning as the analyst reads over previous entries from the current and past projects. In doing so further issues may be triggered in their mind. This reflective and reinforcing practice can further assist with capturing issues that may have been forgotten or to re-assess the logic or reasoning that went into previous courses of action. In this way the record allows improved learning and corrective action to be taken, as the journal acts as a written ‘memory’ of issues and actions, to draw upon in future times, i.e. it acts as a reminder of past experience and as a collection of ‘hindsight’.

1.2. Perspectives on Perspectives via the examination Project Journals with T.O.P²

The T.O.P² framework can also be used as an analysis tool in an attempt to uncover the ‘internal lens’ of the analyst (Hillier 2002). When looking at the work of a team or individuals, evidence is drawn from the products of their efforts such as the system they have developed, project documentation or project journals, as well as in direct communication (where possible) with the team members.

Each user of the T.O.P² framework interprets the problem situation and the T.O.P² framework differently. By comparing across the various analyses (See Figure 2), each set of analysis can be combined to form a more comprehensive picture of the situation or we can layer each to see the priorities or perspectives from which each analyst was coming. For

example, we would expect a computer programmer to have many items in the T lens and a human resources officer to have more in the O and P lenses.

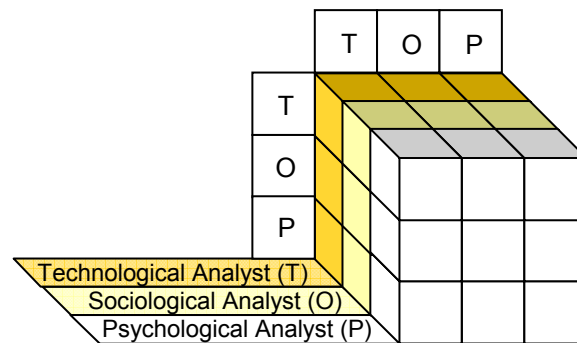


Figure 2 Comparing the analyses of each observer (Hillier 2002)

To summarise, by having each analyst utilise the TOP² framework in their thinking, the outcome would be to produce a broader individual view. Taking this a step further, by combining or overlaying the views of each analyst, the team should be able to increase the richness of their collective understanding of the problem situation.

It is hoped that project managers may also gain a tool in T.O.P². Such actionable knowledge (Argyris 1993) can be used in allocating individuals with diverse views to systems teams. This could be achieved by asking potential team members to analyse a case of a systems development or by having the project manager utilise the TOP² framework to examine potential team member's journals from previous projects. Should this prove successful, it will serve to lessen the likelihood that a vital issue or consideration is overlooked in the carrying out of the project (Checkland 2000).

2. Research in progress

The broader research program into the practical use of the T.O.P² framework has followed a staged approach based on the interpretive stance as in (Walsham 1993). The aim is not to discover correlations or dependencies, but to explore the complexity of the thought of the systems analysts as the situation emerges (understanding as in Kaplan & Maxwell 1994). The examination of journal entries indeed aligns with Phenomenology (as in Boland 1985) – that being the premise that reality consists of things and happenings as they are perceived or understood in someone's mind. Thus the musings in a journal are the product of one's mind.

This staged approach has allowed lessons learnt to be re-injected into the research program. The data collection has followed three main stages so far (see Figure 3).

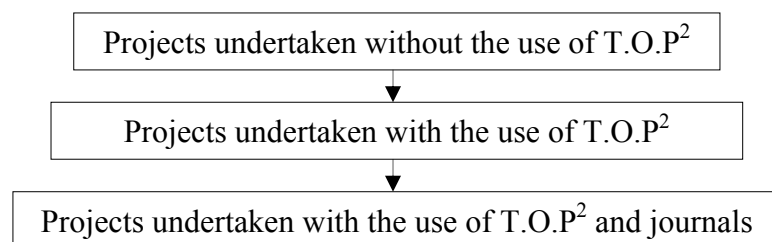


Figure 3 Data collection Stages.

2.1. Main stages of research

The three main stages of this research are explained in more detail below.

2.1.1. Stage One

From the middle of 1998 to the middle of 2002 a number of projects were conducted involving the construction of websites for organisations in the local community. Most were small businesses or small non-profit organisations. The project teams were required to produce a website and project documentation. Areas that the project documentation was to cover were outlined for each team. This stage involved 600 participants over 10 iterations. A number of changes were made from the early iterations until the latter ones including significant changes to the documentation requirements, so some iterations from this set would be unusable if comparing to stages 2 and 3.

2.1.2. Stage Two

From the middle of 2002 to late 2003 the project teams involved in this stage were introduced to the T.O.P² framework. They were given some readings on the origins and use of the T.O.P² framework, as well as some guidelines as to how to apply it to critiquing websites and thinking about the project. Again teams produced a website and project documentation. This stage involved 100 participants over 4 iterations.

2.1.3. Stage Three

Stage three, being the main focus of this paper, saw the introduction of individual project journals using an online system. The project teams also produced a set of project documentation and a website for an organisation. The first iteration of stage two occurred in Late 2003 with 42 individuals involved in 18 projects. The details of the first iteration utilising project journals is outlined in the following section.

2.2. Researching the musings of systems analysts via project journals

Website development projects were chosen as the focus of this research because they represent a 'messy' and complex problem situation (Checkland 1981), involving technical, organisational and personal issues, both for the developers themselves and for the owner operators of small and medium enterprises (SMEs). Secondly, this type of projects is representative of the increase in web-based systems in recent years as is evident by the large growth in the number of hosts on the internet (ISC 2004).

The 42 individuals who were undertaking a senior level undergraduate course in web development were assigned to teams of two or three. However, due to attrition and other factors some people ended up doing the project individually or with a team other than the one to which they were initially allocated. In the end 18 projects were completed. This resulted in 6 teams of with 3 members, 5 teams with 2 members and 6 individuals.

The backgrounds of each team member was considered in allocating the individuals to teams, with the aim of providing diverse skill sets to each team (Martiz & Harrison 2000). However some restrictions prevented optimal allocations due to the distribution of skills sets and the availability of the individuals. The individual's degree major was taken as a proxy for their core competency. The majors represented were, 11 Marketing, 9 Business, 7 Information Systems, 6 Computer Science, 1 Art and 1 Science. See Figure 4 for the distribution of

competencies. There were 11 males and 22 females, this in itself was a surprise given the course is regarded as an information systems topic in which males have traditionally outnumbered females.

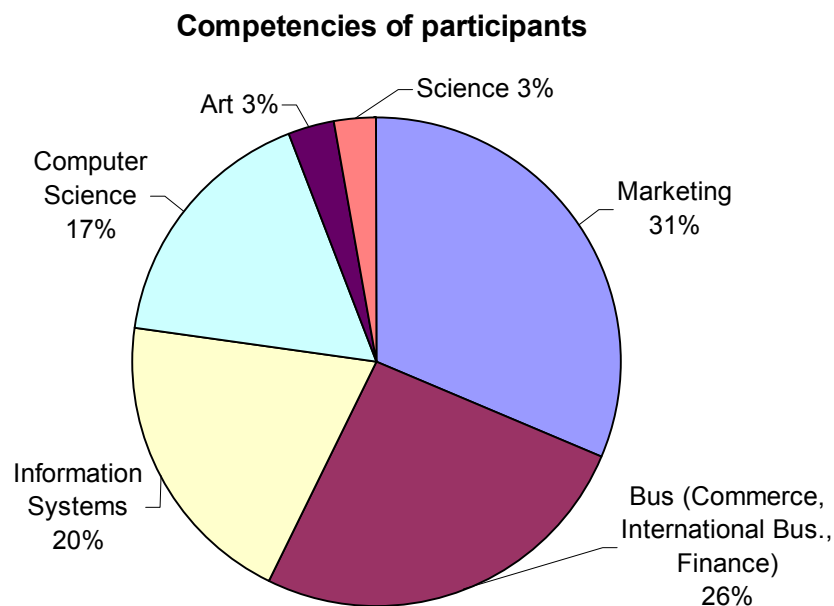


Figure 4 Mix of competencies of participants.

All organisations with which the teams were to work were small businesses, the majority of which were located within the same metropolitan area, although 2 were based in other countries. The task was to design and build a website that would meet the needs of the organisation. In doing the project, each team was expected to produce a website and a set of project documentation. The documentation included a business analysis, technical specification, implementation issues and suggestions for further development. Teams were also asked to utilise the T.O.P² framework to think about the system development and present a completed framework grid along with their documentation. Guidelines for using the T.O.P² framework were provided in the form of readings of papers previously published, including Hillier (2002).

Individual team members were asked to contribute regular entries to an online journal system. The Journal system date stamped each entry and provided confidentiality from the other team members. The design of the journal system was based on the 'concerns and action' format as utilised by Lynch and Metcalfe (2003). Each journal entry required the user to enter four types of information (see Figure 5 for the 'add journal entry' screen). First the contributor was asked to type in a word that described their current state of mind. For example, 'happy', 'sad', 'frustrated', 'angry', 'ecstatic' etc. The choice of words was up to the contributor, indeed some typed smilies :-) to emphasise happiness or sadness.

World Wide Web Development - Microsoft Internet Explorer

File Edit View Favorites Tools Help

World Wide Web Development

General Options

- [Reflective Journal](#)
- [WWW Development](#)
- [Magrathea](#)
- [Unisanet Page](#)

Journal Options

- [Add Entry](#)
- [View Journal](#)
- [View All Journals](#)
- [Chart Progress](#)
- [Account Details](#)
- [Create Account](#)
- [List Users](#)
- [Logout](#)

Journal Help

To add a new entry to the journal, fill out the boxes below and select "Save Entry". If you make a mistake, "Clear Form" will delete everything that you have typed, allowing you to start again.

Notes

Mood: A one-word description as to how you are currently feeling. For example: frustrated, happy, relieved, bored, eager etc.

Progress: Rate how you feel things are progressing in the project.

Entry: The journal entry proper. Here you can talk about anything in this project (or even, if you so desire, other matters). Think about a range of different issues including technical, organisational and personal. These could include the project team, its members, the documentation, requirements, the partner organization and members or case materials, the web site you are constructing, tools and resources used to build it, personal motivations and attitude of yourself and others, your understanding of the situation and relationships between people.

Actions: Write what you think your next steps in the project will be and what actions you can take to overcome any problems mentioned in the entry.

New Journal Entry

Mood

Progress 1 2 3 4 5 6 7 8 9 10 (better)
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Entry

Actions

Save Entry Clear Form

Done Local intranet

Figure 5 the 'add journal entry' screen of the online journal system.

Next they assigned a numerical rating that represented their current perceived level of progress. A Likert scale ranging from 1 to 10 was provided. The journal system also allowed the student to view their progress as a chart (see Figure 6).

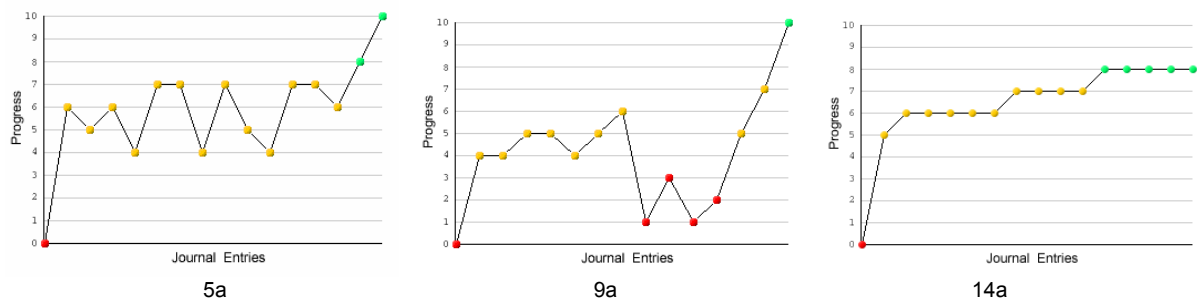


Figure 6 Example of two participant progress charts

Two text boxes provided space to enter their thoughts. The first box was a general space to write things such as feelings, ideas, impressions, problems or concerns. Users were encouraged to write about anything they felt were relevant. Direction was given to consider technical, organisation and personal dimensions of the project. The second box was for writing the actions they would take to address any problems or concerns raised in the first box.

Participants were asked to contribute journals over the full period of the project. The first entry was to be on the day the teams first met as a group and the final entry when they submitted the final product. The aim of this was to capture both the breadth of thoughts about the project and the way in which their impressions of the project changed over time. Participants were asked to complete a minimum of 14 journal entries and were rewarded in the course for doing so.

2.3. Preliminary Findings for Journaling by Systems Analysts

These findings represent a very preliminary look at the research outcomes as they stand at the time of writing. These findings cover the participation by the individuals involved with the project, their performance in the projects and journals and the content analysis technique used to look at the profile of each participant.

The pattern of analysis to be undertaken in this stage of the research is outlined below in Figure 7. However, only the aspects from the analysis of journals is presented in this paper.

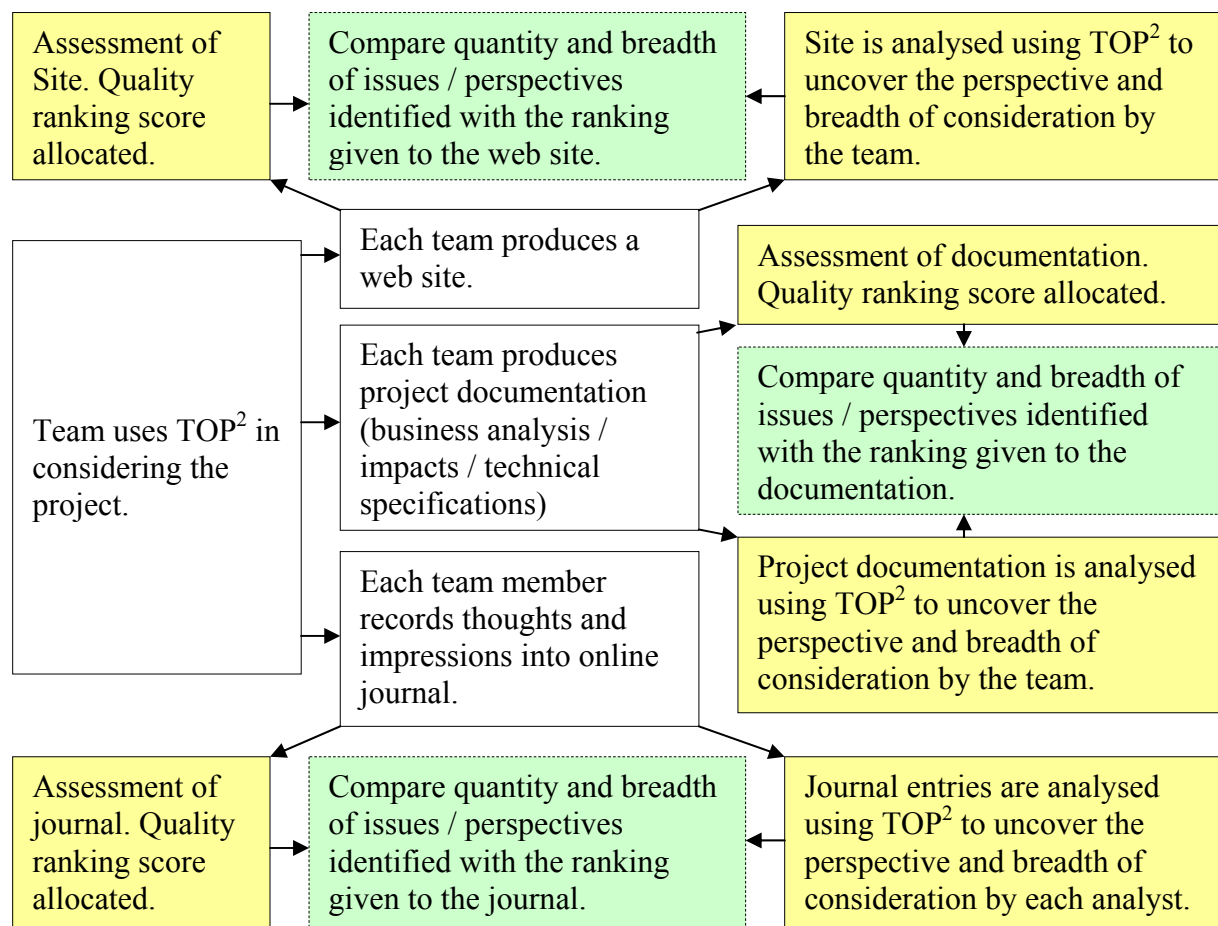


Figure 7 Analysis in Stage 3, iteration 1.

2.3.1. Journaling

Most participants (64%), not surprisingly, contributed close to the number of required entries. See Figure 8. Only one participant utilised the journal more extensively with 22 entries recorded, while 14% participants contributed less than 10 entries to their journal. The required number of journals was tied, in part, to assessment in the course. This is likely to have biased the students use of the journal away from a purely voluntary mechanism in the system development process, although mandated use of certain methods or components is not unheard-of in practitioner environments such as management consulting firms.

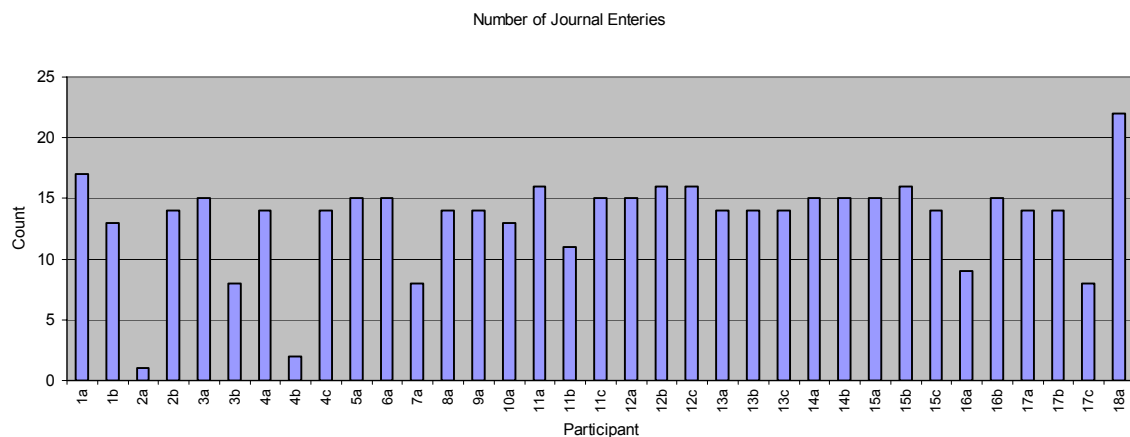


Figure 8 Number of journal entries for each participant.

2.4. Project and Journal Quality

Projects were scored out of 30 and Journals were scored out of 5. Project scores were based on a number of factors including Information Architecture principles (Roesnfield & Morville 1998), usability principles (Nielsen 1999) and documentation quality and breadth of discussion. Breadth was indicated by the coverage of at least technical, organisational and personal matters. The Journal entries were examined by a single assessor and were scored based on three main including breadth of thought (the range of topics and issues explored along the lines of T, O and P), depth of thought (detail and insightfulness of entries) and effort in writing the entries (that minimum entries were present and that they were not just token entries). Ways to overcome problems associated with scoring by a single assessor are discussed under further research.

The comparison of project quality scores (the group score) and journal quality scores for each participant are shown in Figure 9. There appears to be no correlation between individual journal quality and the outcome of the team project. This could be due to the individuals separating their efforts in undertaking the journal and the project, as it may have been deemed that there was little connection between the two due to the separation of scoring. Alternatively this may be due to the differing criteria used to assess the journals and the overall project outcomes as represented by the documentation and website. The participants had access to the scoring criteria prior to the completion of the projects, so it is expected that this would influenced their efforts. Improvements to this component of the research are suggested in the final section of this paper.

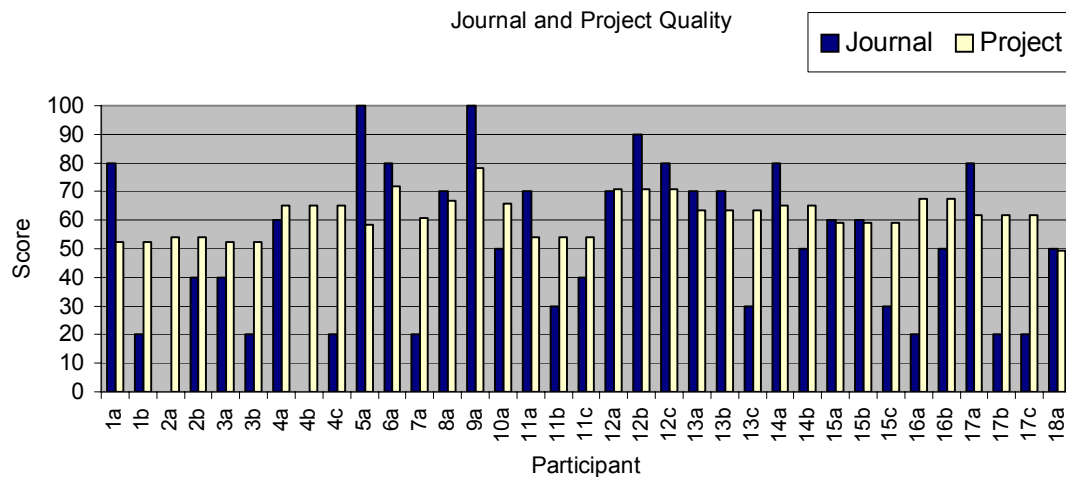


Figure 9 Comparisons between journal quality and project quality for each participant.

2.5. Perspectives in Journal Entries

Content analysis of the journal entries was then carried out using the T.O.P² framework to look for each type of object and the lens through which it was being looked at. The number of each type of object and the lens used were summarised into a T.O.P² table for each participant. Figure 10 shows an example of a profile for one of the participants. The example profile shows that most of this participant's entries in the journal talked about technical objects, while the P lens was the most commonly used lens to look at objects, followed by the T lens, while the O lens was the least utilised. This participant included many statements that incorporated their own lens on the world, which are characteristic of a P lens. An example from the participant showing their state of mind and feeling follows:

"I'm feeling pretty good today, my web site is coming along well, have put in photos today, and just trying to get everything like font and size constant in every page."

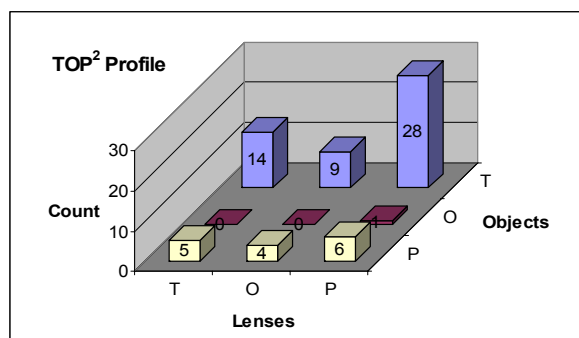


Figure 10 Example T.O.P² profile for a personally orientated participant.

An example from another participant with a similar profile is shown with similar personal level involvement and acknowledgement that the personality of the client impacts the success of the project given personal abilities of the developer.

"Whilst away interstate I managed to catch up with [name deleted] and get some ideas from him on his website. It looks grim, from the perspective that he has very

high hopes and demands (I am but a pathetic novice), and he won't be back in the UK until at least the 12th Jan, so won't be sending any content before then."

In contrast, Figure 11 shows the profile of a very technically focused participant where most of the objects identified were viewed through a technical lens. Objects identified were technical and organisational objects. Individuals were rarely identified. When individuals were noted they were not referred to by name, instead very impersonal labels such as 'the other group member' were used.

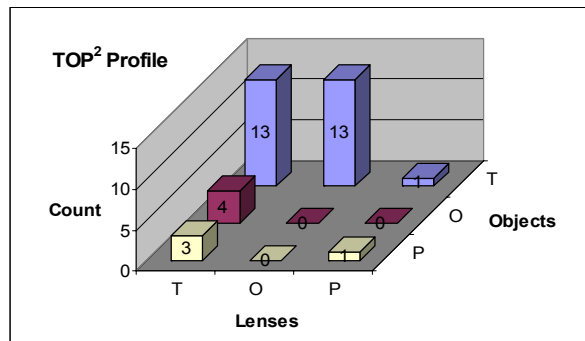


Figure 11 Example T.O.P² profile for a technically orientated participant.

This particular participant also wrote in a rather technical manner, without any expression of personal feeling or state of mind. The journal entries were presented 'statements of fact'. An example follows:

"Organised meeting with the Management Committee of [name removed] at 4:30pm to discuss website contents. Using meeting to take pictures of the facilities and gather information about the organisation. Bought along a sample of web page to show Management Committee in order to finalise colour scheme used for web site."

At the time of writing the analysis was only partially complete, but preliminary results suggest a loose link between the background of the participant, in this case represented by their major, and the concentrations present in the T.O.P² profiles. I.e. that participants from more socially orientated disciplines like Marketing utilised the P lens slightly more than the students from the highly technical disciplines like computer science, who were more technical in their approach. The variation is interesting in the light of the instructions provided at the point of entering journals entries (see Figure 5) that outlined what could be commented about. However, despite being prompted to use the journal for a range of matters, the majority of comments related to project management issues – again probably not that surprising given it was undertaken within the context of a course of studies. It appears at this point in the analysis that all groups identified roughly the same levels of object types, with the highest number concentrated on the technical and people objects in the problem domain, although organisational objects were not excluded. This is perhaps expected in a systems development where novices are becoming accustomed to new technologies and having to work in teams of people that they have only just been introduced. However, as these results are preliminary it would be too early to make any certain claims without further study of the results.

2.6. Further Research

After the profiles of each individual have been completed, they will be combined to form team profiles. These will then be compared to the spread of issues identified in the project

documentation to ascertain if any commonalities occur. This would provide an indication of whether or not the teams with the greatest spread of perspectives produced better projects.

Other improvements or expansion of the research include:

- Surveying the backgrounds of participants in addition to using degree major, which will take the form of a survey of experience or a short interview.
- Research is also planned with groups of industry professionals including systems development teams and managers. These 'experts' will also be interviewed to obtain their perspectives on the usefulness of journals and the T.O.P² framework in comparison to other tools they may have used in the past.
- Utilising a panel of 'experts' who are experienced project managers to assess project outcomes. A panel of experts could also be used to assess the journal entries for quality and thus be used to counter any 'observer bias' on the part of a single assessor.
- Assessing the project outcomes (documentation and website) on the same broader basis as the project journals, but via the use of a panel of experts may lead to different outcomes in regard to the link between journal quality and project quality.

3. Conclusion

The purpose of this paper has been to show that journals are useful mechanisms to record the perspectives gained via the use of the T.O.P² framework. The aim of the T.O.P² framework is to permit a broader set of issues to be considered than otherwise might have been the case. It is hoped that this will go some way to lessening the chance of 'systems failure' or 'project failure'. This paper has also shown how the T.O.P² framework can be used to uncover the breadth of issues that a systems analyst considered in undertaking a project, the benefits of which can include: enhancing the learning of the systems analyst themselves via reflection, as a mechanism that project managers may use in balancing their multidisciplinary project teams, and realising the perspective from which the system was developed (as in the diagnosis of past systems failure).

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